The method used consisted in determining the amount of ammonium sulphate the soil would convert into nitrate during an incubation of eight days. The soils were first spread out on a clean sheet of paper and allowed to become air dry, being carefully protected against dust during this time. To 50 grams of this soil was then added a quantity of 0.4 per cent. ammonium sulphate (about 5 c.c.) sufficient to bring the moisture content to (or a little below) the optimum for plant growth.[2] No tests were carried on in solutions, it having been our experience that nitrifying bacteria do not act normally in test solutions. This fact has also been reported by Stevens and Withers.[3] The amount of nitrates found minus the amount originally found in the soil represents the action of nitrifying bacteria on the ammonium sulphate solution.

The table shows the nitrates found by this method to have been formed in thirty North Carolina farm soils.

Six tests of soil samples from other localities are included for comparison. It will be seen that while our results substantiate the point that nitrification is at a rather low ebb in North Carolina soils, yet nitrifying bacteria are generally present, and if supplied with suitable food would undoubtedly soon multiply sufficiently to cause a normal rate of nitrification.

A comparison of samples nos. 7 and 8 is interesting: no. 7, having a low nitrifying power, was from a portion of a field where crimson clover formed no nodules, and the soil gave a pink reaction; no. 8, showing fairly active nitrification, was from another portion of the same field, gave no reaction to litmus, and root nodules occurred in average numbers. This is typical of much unpublished data upon soils from other regions and leads us to believe that nitrification, nodule formation upon certain species of legumes, and the litmus reaction are correlated.

NITRIFICATION IN NORTH CAROLINA SOILS

No.	Locality. Post-office in North Carolina	Nitrate in Original Sample. p.p.m.	Nitrate Formed in Eight Days from Ammonium Sulphate p.p.m.
1	Cameron	trace	40
2	Dunn	25	100
3	LaGrange	trace	62
4	Roseboro	"	125
5	Richfield	60	125
6	Ahoskie	12	110
7	Wilson	0	20
8	Wilson	0	82
9	Salemburg	0	40
10	Gates	trace	75
11	Shine	"	98
12	Fayetteville	1	33
13	Pisgah	trace	75
14	Hobbsville	"	50
15	Farmville	"	50
16	Hayesville	"	50
17	Durham	"	60
18	Farmville	"	80
19	LaGrange	1	77
20	Sandy Ridge	trace	1
21	Jamesville	1	125
22	Haynes	0	95
23	Ayden	0	34
24	Roxobel	trace	25
25	LaGrange	4	150
26	Pink Hill	trace	59
27	Ashboro	"	42
28	Tarboro	0	1
29	Moretz	trace	102
30	Gatesville	"	32
31	Lanham, Md.	"	300
32	" "	"	100
33	" "	"	500
34	" "	"	225
35	Edgerton, Kan.	160	400
36	New Cambria, Mo.	80	500

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[2] The samples were placed in salt-mouth bottles stopped with a wet plug of cotton to maintain even moisture conditions, and were incubated eight days at 30° C. Distilled water (100 c.c.) was then added to the soil, bottles shaken for fifteen minutes, allowed to settle, filtered, and the clear solution tested by the phenol-disulphonic acid method, as described in Bureau of Soils Bulletin No. 31, p. 40.

[3] Science, N. S., XXVII., No. 704, p. 991.

SECOND ANNUAL SPRING CONFERENCE OF THE GEOLOGISTS OF THE NORTH-EASTERN UNITED STATES

On April 23 and 24 a conference of the geologists of the northeastern United States was held in Philadelphia, Pa., at the invitation of the Mineralogical and Geological Section of the Academy of Natural Sciences. Two sessions for pre-

sentation of papers were held on the first day, and a field trip to typical localities of the pre-Cambrian and early Paleozoic rocks of the region on the second day. After an address of welcome by Dr. Edward J. Nolan, secretary of the academy, seven papers were read, as follows:

The Lower Cambrian of Lancaster County, Pa.: H. JUSTIN RODDY, State Normal School, Millersville, Pa.

The rocks of the Lancaster Valley comprise quartzite, argillite and limestone, in all of which abundant fossils have recently been discovered, including many of the typical forms of the Olenellus fauna. The argillites, in particular, contain magnificently preserved examples of *Olenellus thompsoni* and *Holmia walcotti.* No Middle or Upper Cambrian fossils have as yet been found, but the limestones are overlain on the north by shales of "Hudson River" type, at the base of which traces of Ordovician forms have been observed. Because of complicated structure, the thickness of the Lower Cambrian is not certainly known, but it probably exceeds 3,000 feet.

The Pre-Cambrian Gneisses of the Pennsylvania Piedmont Plateau: MISS BASCOM, Bryn Mawr College.

Of the crystalline rocks of this district the gneisses present the more serious difficulties in the determination of age, origin and stratigraphic relations.

There has been determined the following succession of pre-Cambrian gneisses: hornblende gneiss, granite gneiss, Wissahickon mica gneiss, Baltimore gneiss.

The Baltimore gneiss, underlying the Paleozoic series, to the lowest member of which it has furnished débris, exhibits two facies: a massive facies presumably of igneous origin and a sedimentary facies peripheral in position.

The Wissahickon mica gneiss exhibits many facies, due to the injection and impregnation of a sedimentary formation of somewhat varying composition, but always characterized by an excess of mica. This gneiss is adjacent to, or overlying the Paleozoic series, but is considered to be separated from them by a thrust fault for the following reasons:

1. While the gneiss persists over great areas, the adjacent Paleozoic series change from one member of the series to another and in the thickness of single members.

2. The gneiss shows a coarser crystallization than the adjacent Paleozoics. It is contrasted with the Ordovician mica schist, a formation of similar composition with which it is in contact for long distances, from which the gneiss can always be separated by a greater degree of metamorphism and by structure.

3. The Wissahickon gneiss, like the Baltimore gneiss, is thoroughly intruded by chonoliths of granite, gabbro, pyroxenite and peridotite, which are not found intruded in the Paleozoics.

The hornblende and granite gneisses are manifestly igneous in origin, intrusive in character and younger than the other gneisses.

The Medina and Shawangunk Problems in Pennsylvania: A. W. GRABAU, Columbia University.

The Formation No. IV. of the Pennsylvania Surveys is not all of the same age, as formerly supposed, but comprises two entirely distinct groups of formations. The lower of these includes the Bald Eagle conglomerate, well exposed in the westernmost of the Appalachian ridges, which is of Upper Ordovicic, approximately of Eden age; the Juniata red-beds, corresponding to the Queenstown shales of western New York, of late Lorraine and Richmond age; and the Tuscarora sandstone, the equivalent of the true Medina, marking the base of the Siluric. In the easternmost of the ridges, the Blue Mountain, the conglomerate is the Shawangunk, which is known to be of Salina age; and this is followed by the Longwood shales and they in turn by the Lewistown limestone, which is uppermost Siluric. The conglomerates and shales are believed to be of continental origin, representing the alternation of torrential deposits with flood plain and æolian deposits under semi-arid climates. Their geographical distribution shows them to have the form of great alluvial fans, deposited by rivers flowing from the southeast; and the occasional intercalated fossiliferous beds represent the temporary advance of the sea upon the margins of the fans.

The Buried Gorge of the Hudson River: W. O. CROSBY, Massachusetts Institute of Technology.

Glacial Erosion in Great Britain, France and Switzerland: DOUGLAS WILSON JOHNSON, Harvard University.

This paper discussed two questions: (1) Are hanging tributary valleys a reliable indication of glacial erosion of the main valley? (2) May not hanging tributary valleys result from glacial *widening* of the main valley, instead of from glacial *deepening?* It was shown that while the formation of hanging valleys by normal stream

erosion is possible under certain conditions, the occurrence of hanging valleys of this type is exceptional, and their peculiar origin may be detected by associated physiographic features. It was concluded that in general hanging tributary valleys of the common type are to be regarded as proof of glacial erosion. A study of the relations normally existing between stream valleys and their tributaries proves that hanging tributary valleys of any length can hardly be produced by glacial widening of the main valley, and that where such hanging valleys exist a significant amount of glacial over-deepening must be inferred. A method of estimating the actual amount of glacial over-deepening of valleys with a fair degree of accuracy was described, and the application of this method to glaciated valleys in Europe was discussed. Glacial over-deepening amounting from 600 to over 1,000 feet was found to have occurred in three of the valleys studied.

On the basis of this study it was concluded that no account of drainage modifications in glaciated regions could be regarded as complete if it failed to take account of the possible changes due to glacial erosion. The relation of this study to the drainage problems in western New York, and to engineering problems in the gorge of the Hudson River, was briefly touched upon.

The Early Paleozoic of the Lehigh Valley District, Pennsylvania: EDGAR T. WHERRY, Lehigh University.

Contrary to the usual opinion, it has been found that the Cambrian and Ordovician portions of the Great Valley limestones in this district can be readily distinguished on a lithologic basis, five formations being recognizable between the Hardyston quartzite of Lower Cambrian age and the Martinsburg shale of Lower Trenton to Utica age, as follows (local names being provisionally applied, and the thicknesses roughly estimated): Leithsville formation, Lower-Middle Cambrian, gray dolomite with abundant sandy and cherty layers, and buff-colored shale beds, 1,500 feet. Allentown limestone, Upper Cambrian, white to gray, dolomitic, largely oolitic, full of Cryptozoon, 2,000 feet. Coplay limestone, Beekmantown, dark gray, shaly, with mottled crystalline layers, numerous fossils, 1,500 feet. A marked erosion interval occurs here, so that the whole thickness of the Coplay is rarely seen. Nisky formation, Black River, gray, very shaly limestone, probably never exceeding 100 feet in thickness. Nazareth cement rock, Lower Trenton, varying from 500 feet or more down to zero, being replaced westward and southward by the Martinsburg shale. The presence of two small areas of Shawangunk conglomerate, preserved by down-faulting some twenty miles south of the main exposure in the Blue Ridge, corresponding in position and lithologic character to the Green Pond of New Jersey, is also announced.

Characteristics of the Older Crystallines of Southeastern New York: CHARLES P. BERKEY, Columbia University.

There are but three well-established formations belonging to the completely metamorphosed series of the vicinity of New York City. These are:

(*a*) Fordham gneiss and its associates (oldest).

(*b*) Inwood limestone.

(*c*) Manhattan schist (youngest).

The Fordham gneiss and Manhattan schist are not always readily distinguished. Certain varieties of each are alike in every essential character, and if the evidence is confined to these varieties no determination can be made. This is especially true of the intrusive members.

A study of thousands of cases where discrimination between these two formations was necessary has convinced the writer that the most constant characters of the Manhattan schist in order of importance are:

(*a*) The presence of a white pearly mica.

(*b*) Coarse foliation.

(*c*) A crumpled structure.

And in contrast the most constant Fordham gneiss characters are:

(*a*) A banded structure.

(*b*) Close granular or granitoid texture merging into foliation.

(*c*) Abundance of feldspathic constituents.

During the past year a study of Manhattan Island, especially the covered portion of the southern third, and adjacent areas southward on Long Island, has been made by means of an examination of all drill borings whose materials could be seen—several hundred in all. Discrimination by the above criteria indicates a much more complex structure and areal distribution than formerly mapped. Both gneiss and limestone are represented in these southerly areas. Recent borings placed for the purpose of testing this structure have proved the case beyond any question by penetrating both of these formations at points indicated by this interpretation.

EDGAR T. WHERRY,
Secretary